HIGHLANDS PEAT OF THE MALAYAN PENINSULA

B. R. Hewitt

Chemistry Department, University of Malaya, Kuala Lumpur Malaysia

[Read 30th November, 1966]

Synopsis

The factors responsible for the formation of highland peat on the Malayan Peninsula are mentioned together with analytical results for a peat from Gunong Erau, Malaya.

The highland peat of the tropics is quite a distinct formation from the peat found on the lowlands. In contrast to the extensive lowland peat (two million acres in the Malayan Peninsula, 40 million acres in Indonesia) highland peat is found in isolated areas on the tops of mountains where the underlying rock is quite acidic.

Mohr in 1922 stated after examination of the Hjang-Plateau in Besoeki, Indonesia, "Man findet dort merkwurdigerweise Stellen mit einer Art von bleichem Torf bedeckt welche sich halten kann unter Einwirkung der Kombinationen von niedriger Temperatur und des Unterwasserstehens."

In 1930 Vageler maintained that only those mountain peats formed from Sphagnum were genuine Highmoors. This would appear to be too rigid a classification. Tropical highmoors contain Sphagnum moss but in Malaya, at least, there is also present forest vegetation which, however, does not reach the full development of the lowland forest and does contribute material for the formation of peat.

In Indonesia, highmoor peats are formed in Sumatra, Toba-Ebene, 1,450 m. (4,750 ft.); in Java, at Gedeh, Telaga-Saät, 1,400 m. (4,570 ft.), Dieng Plateau, 2,000 m. (6,500 ft.); in Celebes, at Lindessee, 1,000 m. (3,260 ft.).

Many of the craters of Indonesian mountains contain swamps in which peat forms. In addition to *Sphagnum* and *Juncus prismatocarpus R.Br.*, swamp grasses and Cyperaceae grow on the banks (von Faber, 1927).

This type of peat present in the tropics is found in many parts of the world and is typical of Europe and other areas with temperate climates. They occur in Australia in humid localities, usually in parent materials of low base status and the vegetation is often dominated by Cyperaceae (Stephens, 1949-50).

On the Malayan Peninsula highmoor peat is formed at altitudes greater than 1,500 m. (4,900 ft.), usually on relatively bare quartzite or acid granite ridges (Scrivenor, 1931) having a typical vegetation of montane ericaceous forest with sphagnum and lichens on the ground (Wyatt-Smith, 1954).

The montane ericaceous forest occurs above 1,500 m. (4,900 ft.) on exposed ridges and consists of dwarfed vegetation carrying masses of epiphytes. The main species present are: Fagaceae, *Pasania lampadaria*, *Pasania rassa*; Ericaceae, *Pieris ovalifolia*, *Vaccinium* spp. *Rhododendron* spp.; Elaeocarpaceae, *Elaeocarpus masterii*; Myrtaceae, *Eugenia* spp., *Rhodamnia cinerea*, *Tristania merguensis*; Theaceae, *Ternstroemia japonica*, *Anneslea crassipes*; Symplocaceae, *Symplocos* spp.; Rutaceae, *Astrophyllum montanum*, *Tetractomia tetrandra*; Guttiferae, *Garcinia* spp.; Aquifoliaceae, *Ilex* spp.; Myrsinaceae, *Myrsine posteriana*; Lauraceae, *Phoebe declinata*; Pentaphylacaceae, *Pentaphylax arborea*; Buxaceae, *Buxus* spp.

Peat forms a layer on the ground to a maximum depth of about 5 cms. but will accumulate to greater depths in rock crevasses. It is not associated

with swamps or ponds, and its accumulation is due to the continually humid conditions and low temperatures preventing oxidation of the plant material and to the presence of very acid rock underlying it.

Samples of peat were taken from Gunong Erau in the Cameron Highlands at the height of approximately 1,960 m. (6,400 ft.). Here the daily average temperature ranges from 14·1-23°C. (57·6-73·4°F.), the relative humidity at 1 p.m. is greater than 98% throughout the year, while the total rainfall is 2,687 mm. (105·5 inches) and the lowest average rainfall in any month is 129 mm. (five inches). There was no visible difference in the samples which were of a reddish brown colour. The results of analysis are given in Table 1.

Table 1

Analysis of peat from Gunong Erau

Sample depth	pH	Ash content % (on dry basis)	Loss on ignition % (on dry basis)
0–20 cm. (0–8 inches) ..	2·0	2·6	97·4
20–40 cm. (8–16 inches) ..	2·0	2·3	97·7
40–60 cm. (16–24 inches) ..	2·3	7·3	92·7

The pH was determined on dried peat in IM.KCl with a soil KCl ratio of 1 to 5.

Humus fractions were determined according to the procedure of Konanova, 1961, and are given in Table 2.

Table 2

Humus fraction (Percentage of dry weight of sample)

Sample depth	Humin + Ulmin	Hymato -melanic acid	Crenic + Apocrenic acids	Humic + Ulmic acids
0–20 cm. (0–8 inches)	25·0	14·6	55·4	5·0
20–40 cm. (8–16 inches) ..	30·0	10·4	53·0	7·3
40–60 cm. (16–24 inches) ..	25·0	18·5	47·5	9·0

The low ash contents and pH's of all the samples are striking. There is a slight decrease in acidity and increase in ash content with increase in depth.

Analysis of similar material at the University of Liverpool (Burges, 1966) showed that it contained degradation products characteristic of humic acid found under broad-leaved forests in Europe (Burges, *et al.*, 1964).

The similarity to peat material from temperate regions is not unusual, since the climate of the Cameron Highlands of Malaya is temperate and the vegetation is similar to heath vegetation.

References

Burges, N. A., Hurst, H. M., and Wakkenden, B., 1964.—The phenolic constituents of humic acid and their relation to the lignin of the plant cover. *Geochem. et Cosmochim. Acta.* 28 : 1547–1554.

Burges, N. A., 1966.—Private communication.

Faber, F. C., von, 1927.—" Die Kraterpflanzen Javas Welterreden ".

Konanova, M. M., 1961.—Soil Organic Matter. (Pergamon Press, Oxford.).

Mohr, E. C. J., 1922.—" De grond van Java en Sumatra ". (Amsterdam.).

Scrivenor, J. B., 1931.—" The Geology of Malaya ". (Macmillan, London.).

Stephens, C. G., 1949–50.—Comparative morphology and genetic relationships of certain Australian, North American and European soils. *J. Soil. Sci.*, 1(2) : 124–129.

Vageler, P., 1930.—" Grundriss der tropischen und subtropischen Bodenkunde ". (Berlin.).

Wyatt-Smith, J., 1954.—Forest types in the Federation of Malaya. *Malay Forester*, xvii : 83–84.